

Al's cord
determining whether said radio device of said mobile computing system is within range to transmit data to said access point and to receive data from said access point;

transmitting said remote access request frames to said access point in response to a determination that said mobile computing system is associated with an access point, and additionally in response to a determination that said radio device is within range; and

transmitting said remote access request frames without a destination address in response to determinations that said mobile computing system is not associated with an access point and that said radio device of said mobile computing system is not within range.

58 (Amended). A computer data signal embodied in a carrier wave comprising computer readable instructions, wherein said computer readable instructions loaded into an access point, including a radio device, a connection to a communications network, information storage, and a microprocessor, which executes a program causing said access point to perform the steps of:

- a) receiving remote access request frames through said radio device;
- b) determining whether to grant remote association to a remote computing system initially transmitting said remote access request frames in response to receiving said remote access request frames;
- c) in response to determining to grant remote association to said remote computing system, storing addresses identifying one or more intermediate mobile units received with said remote access request frames in said information storage, generating remote response frames, adding said addresses to said remote response frames and transmitting said remote access response frames through said radio device.

REMARKS

Applicants request the Preliminary Amendment be entered before the application is examined.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with markings to show changes made".

Respectfully Submitted,



Carlos Munoz-Bustamante
Reg. No. 51,349

Customer No. 25299

IBM CORPORATION
Personal and Printing Systems Group
Intellectual Property Law
Department 9CCA/Building 002-2
P. O. Box 12195
Research Triangle Park, NC 27709

CMB:as
(919)254-2587
FAX 919-254-2649



VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

1 (Amended). A method for providing wireless data communication between an access point connected to a communication network and a remote mobile unit, out of range of direct wireless communication with said access point, wherein said method comprises:

a) establishing a path between said remote mobile unit and said access point, wherein said path includes one or more intermediate mobile units, wherein a first intermediate mobile unit among said intermediate mobile units communicates directly by radio with said access point, and wherein pairs of mobile units adjacent one another along said path communicate[d] directly with one another by radio; and

b) sending data along said path between said remote mobile unit and said access point, wherein each said intermediate mobile unit in said path receives wirelessly transmitted data [**transmitted by wireless**] along said path in a first direction, and wherein each said intermediate mobile unit in said path then transmits said data to continue in said first direction along said path.

6 (Amended). The method of claim 2, [**wherein**] further comprising the steps of:

[**said remote mobile unit receives**] receiving a plurality of said remote access response information at said remote mobile unit, including a plurality of paths described by addresses identifying said access point and said intermediate mobile units, and

storing a path first received by said remote mobile unit [**is stored**] within said remote mobile unit to describe said path for sending data in step b).

13 (Amended). A mobile computing system comprising:

a radio device;

information storage; and

a microprocessor programmed to cause said mobile computing system to perform the steps of:

a) determining whether said radio device is within range to transmit data to an access point and to receive data from said access point;

b) requesting association with said access point in response to the determining [in] step a) [that said radio device is within range to transmit data to said access point and to receive data from said access point, requesting association with said access point];

c) transmitting remote access request frames through said radio device in response to the determining [in] step a) [that said radio device is out of range to transmit data to said access point and to receive data from said access point, transmitting remote access request frames through said radio device];

d) storing in said information storage, in response to receiving first remote access response frames through said radio device, [storing in said information storage, from said first remote access response frames,] addresses of an access point and of intermediate computing systems providing a first path between said mobile computing system and said access point;

e) adding said addresses of said access point and of said intermediate computing systems to data frames to be transmitted; and

f) transmitting said data frames through said radio device.

14 (Amended). The mobile computing system of claim 13, wherein said microprocessor is programmed to cause said mobile computing system to perform the additional steps of:

storing in a data structure within said information storage, after step d)[,] and in response to receiving additional remote access response frames, [storing] addresses of one or more access points and of intermediate computing systems[,] thereby providing a plurality of additional paths between said mobile computing system and said one or more access points[, in a data structure within said information storage];

examining received data frames to determine if a data transmission problem exists; and

[in response to determining that a data transmission problem exists,] adding addresses forming a path in said plurality of additional paths stored in said data structure to said data frames to be transmitted when a data transmission problem exists.

15 (Amended). The mobile computing system of claim 14, wherein said microprocessor is programmed to cause said mobile computing system to perform an additional step of [,] repeating steps a) through f) in response to determining that a data transmission problem exists, and additionally in response to determining that all paths stored in said data structure have been used **[, repeating steps a) through f)].**

17 (Amended). The mobile computing system of claim 13, wherein step a) includes:
transmitting probe frames through said radio device, and
determining that said radio device is within range to transmit data to an access point and to receive data from said access point if response frames, transmitted from said access point in response to said probe frames, are received through said radio device within a predetermined time.

19 (Amended). A mobile computing system comprising:

a radio device;

information storage; and

a microprocessor programmed to cause said mobile computing system to perform the steps of:

- a) receiving, through said radio device, remote access request frames transmitted from a remote mobile unit;
- b) following step a), determining if communication bandwidth is available within said mobile computing system;
- c) retransmitting said remote access request frames in response to determining that said communication bandwidth is available within said mobile computing system[, **retransmitting said remote access request frames**];
- d) receiving, through said radio device, data frames with an address of said mobile computing system in a path extending between said remote mobile unit and an access point; and
- e) transmitting said data frames received in step d) to a next computing system along said path.

21 (Amended). The mobile computing system of claim 19, wherein said microprocessor is additionally programmed to cause said mobile computing system to perform, following step d), the steps of:

- f) determining if said data frames indicate that a present number of paths being used through said mobile computing system between one or more remote mobile systems and one or more access points has changed; and
- g) changing a path number variable stored in said information storage in response to an indication in step f) that said number of paths has changed.

22 (Amended). The mobile computing system of claim 21, wherein step f) includes:

- h) determining if said data frames are initially sent from a remote mobile system;
- i) determining whether an address identifying said remote mobile system is stored in said information storage in response to a determination that said data frames are initially sent from a remote mobile system[, **determining whether an address identifying said remote mobile system is stored in said information storage**];
- j) storing said address identifying said remote mobile system in said information storage and adding one to said path number variable in response to a determination that said address identifying said remote mobile system is not stored in said information storage[, **storing said address identifying said remote mobile system in said information storage and adding one to said path number variable**].

23 (Amended). The mobile computing system of claim 22, wherein step f) additionally includes:

- k) determining whether a termination tag is present in said data frames in response to a determination that said data frames are initially sent from a remote mobile system[, **determining whether a termination tag is present in said data frames**]; and
- l) deleting an address identifying said remote mobile system from said information storage and decreasing said path number variable by one in response to a determination that said termination tag is present in said data frames[, **deleting an address identifying said remote mobile system from said information storage and decreasing said path number variable by one**].

24 (Amended). The mobile computing system of claim 19, wherein said microprocessor is additionally programmed to cause said mobile computing system to perform, between steps d) and e), the steps of:

determining that said data frames are initially sent by an access point;
determining if sufficient bandwidth is available within said mobile computing system;

adding a termination tag to said data frames in response to a determination that sufficient bandwidth is not available[, **adding a termination tag to said data frames**].

25 (Amended). The mobile computing system of claim 19, wherein step c) includes:

determining whether said mobile computing system is associated with an access point;

determining whether said radio device of said mobile computing system is within range to transmit data to said access point and to receive data from said access point;

transmitting said remote access request frames to said access point in response to a determination that said mobile computing system is associated with an access point, and additionally in response to a determination that said radio device is within range[, **transmitting said remote access request frames to said access point**]; and

transmitting said remote access request frames without a destination address in response to determinations that said mobile computing system is not associated with an access point and that said radio device of said mobile computing system is not within range [**transmitting said remote access request frames without a destination address**].

26 (Amended). An access point comprising:

a radio device;
a connection to a communications network;

information storage; and

a microprocessor programmed to cause said access point to perform the steps of:

a) receiving remote access request frames through said radio device;
b) determining whether to grant remote association to a remote computing system initially transmitting said remote access request frames in response to receiving said remote access request frames[, **determining whether to grant remote association to a remote computing system initially transmitting said remote access request frames**];

c) in response to determining to grant remote association to said remote computing system, storing addresses identifying one or more intermediate mobile units received with said remote access request frames in said information storage, generating remote response frames, adding said addresses to said remote response frames and transmitting said remote access response frames through said radio device.

29 (Amended). A computer usable medium storing computer readable instructions, wherein said computer readable instructions loaded into a mobile computing system, including a radio device, information storage, and a microprocessor, to execute a program **[cause] which causes** said mobile computing system to perform the steps of:

a) determining whether said radio device is within range to transmit data to an access point and to receive data from said access point;

b) requesting association with said access point in response to the determining **[in] step a) [that said radio device is within range to transmit data to said access point and to receive data from said access point, requesting association with said access point]**;

c) transmitting remote access request frames through said radio device in response to the determining **[in] step a) [that said radio device is out of range to**

transmit data to said access point and to receive data from said access point, transmitting remote access request frames through said radio device];

d) storing in said information storage, in response to receiving first remote access response frames through said radio device, **[storing in said information storage, from said first remote access response frames,]** addresses of an access point and of intermediate computing systems providing a first path between said mobile computing system and said access point;

e) adding said addresses of said access point and of said intermediate computing systems to data frames to be transmitted; and

f) transmitting said data frames through said radio device.

30 (Amended). The computer usable medium of claim 29, wherein said program additionally causes said mobile computing system to perform the steps of:

storing in a data structure within said information storage, after step d)[,] and in response to receiving additional remote access response frames, **[storing]** addresses of one or more access points and of intermediate computing systems[,] thereby providing a plurality of additional paths between said mobile computing system and said one or more access points[, **in a data structure within said information storage**];

examining received data frames to determine if a data transmission problem exists; and

[in response to determining that a data transmission problem exists,] adding addresses forming a path in said plurality of additional paths stored in said data structure to said data frames to be transmitted when a data transmission problem exists.

31 (Amended). The computer usable medium of claim 30, wherein said program additionally causes said mobile computing system to perform a step of[,] repeating steps

a) through f) in response to determining that a data transmission problem exists, and additionally in response to determining that all paths stored in said data structure have been used[, **repeating steps a) through f)**].

33 (Amended). The computer usable medium of claim 29, wherein step a) includes:
transmitting probe frames through said radio device, and
determining that said radio device is within range to transmit data to an access point and to receive data from said access point if response frames, transmitted from said access point in response to said probe frames, are received through said radio device within a predetermined time.

35 (Amended). A computer usable medium storing computer readable instructions, wherein said computer readable instructions loaded into a mobile computing system, including a radio device, information storage, a display unit, and a microprocessor, to execute a program [**cause**] which causes said mobile computing system to perform the steps of:

- a) receiving, through said radio device, remote access request frames transmitted from a remote mobile unit;
- b) following step a), determining if communication bandwidth is available within said mobile computing system;
- c) retransmitting said remote access request frames in response to determining that said communication bandwidth is available within said mobile computing system[, **retransmitting said remote access request frames**];
- d) receiving, through said radio device, data frames with an address of said mobile computing system in a path extending between said remote mobile unit and an access point; and

e) transmitting said data frames received in step d) to a next computing system along said path.

37 (Amended). The computer usable medium of claim 35, wherein said program additionally causes said mobile computing system to perform, following step d), the steps of:

f) determining if said data frames indicate that a present number of paths being used through said mobile computing system between one or more remote mobile systems and one or more access points has changed; and

g) changing a path number variable stored in said information storage in response to an indication in step f) that said number of paths has changed.

38 (Amended). The computer usable medium of claim 37, wherein step f) includes:

h) determining if said data frames are initially sent from a remote mobile system;

i) determining whether an address identifying said remote mobile system is stored in said information storage in response to a determination that said data frames are initially sent from a remote mobile system[, **determining whether an address identifying said remote mobile system is stored in said information storage**];

j) storing said address identifying said remote mobile system in said information storage and adding one to said path number variable in response to a determination that said address identifying said remote mobile system is not stored in said information storage[, **storing said address identifying said remote mobile system in said information storage and adding one to said path number variable**].

39 (Amended). The computer usable medium of claim 38, wherein step f) additionally includes:

k) determining whether a termination tag is present in said data frames in response to a determination that said data frames are initially sent from a remote mobile system[, **determining whether a termination tag is present in said data frames**]; and

l) deleting an address identifying said remote mobile system from said information storage and decreasing said path number variable by one in response to a determination that said termination tag is present in said data frames[, **deleting an address identifying said remote mobile system from said information storage and decreasing said path number variable by one**].

40 (Amended). The computer usable medium of claim 35, wherein said microprocessor is additionally programmed to cause said mobile computing system to perform, between steps d) and e), the steps of:

determining that said data frames are initially sent by an access point;

determining if sufficient bandwidth is available within said mobile computing system;

adding a termination tag to said data frames in response to a determination that sufficient bandwidth is not available[, **adding a termination tag to said data frames**].

41 (Amended). The computer usable medium of claim 35, wherein step c) includes:

determining whether said mobile computing system is associated with an access point;

determining whether said radio device of said mobile computing system is within range to transmit data to said access point and to receive data from said access point;

transmitting said remote access request frames to said access point in response to a determination that said mobile computing system is associated with an access point, and additionally in response to a determination that said radio device is within range[, **transmitting said remote access request frames to said access point**]; and

transmitting said remote access request frames without a destination address in response to determinations that said mobile computing system is not associated with an access point and that said radio device of said mobile computing system is not within range [**transmitting said remote access request frames without a destination address**].

42 (Amended). A computer usable medium storing computer readable instructions, wherein said computer readable instructions loaded into an access point, including a radio device, a connection to a communications network, information storage, and a microprocessor, **[to execute] which executes a program [cause] causing** said access point to perform the steps of:

a) receiving remote access request frames through said radio device;
b) determining whether to grant remote association to a remote computing system initially transmitting said remote access request frames in response to receiving said remote access request frames[, **determining whether to grant remote association to a remote computing system initially transmitting said remote access request frames**];

c) in response to determining to grant remote association to said remote computing system, storing addresses identifying one or more intermediate mobile units received with said remote access request frames in said information storage, generating remote response frames, adding said addresses to said remote response frames and transmitting said remote access response frames through said radio device.

45 (Amended). A computer data signal embodied in a carrier wave comprising computer readable instructions, wherein said computer readable instructions loaded into a mobile computing system, including a radio device, information storage, and a

microprocessor, to execute a program **[cause]** which causes said mobile computing system to perform the steps of:

- a) determining whether said radio device is within range to transmit data to an access point and to receive data from said access point;
- b) requesting association with said access point in response to the determining **[in]** step a) **[that said radio device is within range to transmit data to said access point and to receive data from said access point, requesting association with said access point];**
- c) transmitting remote access request frames through said radio device in response to the determining **[in]** step a) **[that said radio device is out of range to transmit data to said access point and to receive data from said access point, transmitting remote access request frames through said radio device];**
- d) storing in said information storage, in response to receiving first remote access response frames through said radio device, **[storing in said information storage, from said first remote access response frames,]** addresses of an access point and of intermediate computing systems providing a first path between said mobile computing system and said access point;
- e) adding said addresses of said access point and of said intermediate computing systems to data frames to be transmitted; and
- f) transmitting said data frames through said radio device.

46 (Amended). The computer data signal of claim 45, wherein said program additionally causes said mobile computing system to perform the steps of:

storing in a data structure within said information storage, after step d)[,] and in response to receiving additional remote access response frames, **[storing]** addresses of

one or more access points and of intermediate computing systems[,] thereby providing a plurality of additional paths between said mobile computing system and said one or more access points[, **in a data structure within said information storage**];

examining received data frames to determine if a data transmission problem exists;
and

[in response to determining that a data transmission problem exists,] adding addresses forming a path in said plurality of additional paths stored in said data structure to said data frames to be transmitted when a data transmission problem exists.

47 (Amended). The computer data signal of claim 46, wherein said program additionally causes said mobile computing system to perform a step of[,] repeating steps a) through f) in response to determining that a data transmission problem exists, and additionally in response to determining that all paths stored in said data structure have been used[, **repeating steps a) through f)**].

49 (Amended). The computer data signal of claim 45, wherein step a) includes:
transmitting probe frames through said radio device, and
determining that said radio device is within range to transmit data to an access point and to receive data from said access point if response frames, transmitted from said access point in response to said probe frames, are received through said radio device within a predetermined time.

51 (Amended). A computer data signal embodied in a carrier wave comprising computer readable instructions, wherein said computer readable instructions loaded into a mobile computing system, including a radio device, information storage, a display unit, and a microprocessor, to execute a program **[cause]** which causes said mobile computing system to perform the steps of:

- a) receiving, through said radio device, remote access request frames transmitted from a remote mobile unit;
- b) following step a), determining if communication bandwidth is available within said mobile computing system;
- c) retransmitting said remote access request frames in response to determining that said communication bandwidth is available within said mobile computing system[, **retransmitting said remote access request frames**];
- d) receiving, through said radio device, data frames with an address of said mobile computing system in a path extending between said remote mobile unit and an access point; and
- e) transmitting said data frames received in step d) to a next computing system along said path.

53 (Amended). The computer data signal of claim 51, wherein said program additionally causes said mobile computing system to perform, following step d), the steps of:

- f) determining if said data frames indicate that a present number of paths being used through said mobile computing system between one or more remote mobile systems and one or more access points has changed; and
- g) changing a path number variable stored in said information storage in response to an indication in step f) that said number of paths has changed.

54 (Amended). The computer data signal of claim 53, wherein step f) includes:

- h) determining if said data frames are initially sent from a remote mobile system;

i) determining whether an address identifying said remote mobile system is stored in said information storage in response to a determination that said data frames are initially sent from a remote mobile system[, **determining whether an address identifying said remote mobile system is stored in said information storage**];

j) storing said address identifying said remote mobile system in said information storage and adding one to said path number variable in response to a determination that said address identifying said remote mobile system is not stored in said information storage[, **storing said address identifying said remote mobile system in said information storage and adding one to said path number variable**].

55 (Amended). The computer data signal of claim 54, wherein step f) additionally includes:

k) determining whether a termination tag is present in said data frames in response to a determination that said data frames are initially sent from a remote mobile system[, **determining whether a termination tag is present in said data frames**]; and

l) deleting an address identifying said remote mobile system from said information storage and decreasing said path number variable by one in response to a determination that said termination tag is present in said data frames[, **deleting an address identifying said remote mobile system from said information storage and decreasing said path number variable by one**].

56 (Amended). The computer data signal of claim 51, wherein said microprocessor is additionally programmed to cause said mobile computing system to perform, between steps d) and e), the steps of:

determining that said data frames are initially sent by an access point;

determining if sufficient bandwidth is available within said mobile computing system;

adding a termination tag to said data frames in response to a determination that sufficient bandwidth is not available[, **adding a termination tag to said data frames**].

57 (Amended). The computer data signal of claim 51, wherein step c) includes:

determining whether said mobile computing system is associated with an access point;

determining whether said radio device of said mobile computing system is within range to transmit data to said access point and to receive data from said access point;

transmitting said remote access request frames to said access point in response to a determination that said mobile computing system is associated with an access point, and additionally in response to a determination that said radio device is within range[, **transmitting said remote access request frames to said access point**]; and

transmitting said remote access request frames without a destination address in response to determinations that said mobile computing system is not associated with an access point and that said radio device of said mobile computing system is not within range [**transmitting said remote access request frames without a destination address**].

58 (Amended). A computer data signal embodied in a carrier wave comprising computer readable instructions, wherein said computer readable instructions loaded into an access point, including a radio device, a connection to a communications network, information storage, and a microprocessor, **[to execute]** which executes a program **[cause]** causing said access point to perform the steps of:

- a) receiving remote access request frames through said radio device;

b) determining whether to grant remote association to a remote computing system initially transmitting said remote access request frames in response to receiving said remote access request frames[, **determining whether to grant remote association to a remote computing system initially transmitting said remote access request frames**];

c) in response to determining to grant remote association to said remote computing system, storing addresses identifying one or more intermediate mobile units received with said remote access request frames in said information storage, generating remote response frames, adding said addresses to said remote response frames and transmitting said remote access response frames through said radio device.